CLAIMS

Sub B1

1. A time of flight mass spectrometer for measuring the m/z of ionised particles, the spectrometer comprising: an ion source for generation of said ionised particles, acceleration means for acceleration of said ionised particles so as to form an ion beam, means for sampling from the ion beam such that a share of the beam is detected on each of two detectors such that the time of flights for any or all ions of a given m/z to each of the two detectors is used for the purpose of improving the accuracy of measurement of the m/z values of ions.

2. A spectrometer according to claim 1, in which the spectrometer includes temporal focusing means for at least partially compensating for any spread in the initial kinetic energies of particles of a given m/z so as to provide two temporal focal points, wherein each detector is situated at a respective temporal focal point.

a Sub B2

3. A spectrometer according to claim 1 ~~or claim 2~~, wherein the spectrometer includes interfacing means for transporting, or allowing the transport of ions from the sample to the acceleration means.

a

4. A spectrometer according to claim 1 ~~claims 1 to 3~~ wherein the direction of the ion beam at the entry to the acceleration means is inclined at any angle to the direction of acceleration.

a

5. A spectrometer according to claim 1 ~~claims 1 to 4~~, in which the focusing means comprises reflection means for reflecting the particles in the beam in such a way that the higher the kinetic energy of particles of a given charges and mass, the longer the path of those particles through the reflection means, the reflection means being situated in the path of the beam between the two detectors.

6. A spectrometer according to claim 5, in which the focusing means comprises further reflection means positioned in the path of the beam between the sample and first of the detectors so that the beam is of a generally serpentine shape.

a

claim 1

7. A spectrometer according to ~~any of the preceding claims~~, in which the spectrometer includes a laser for releasing said ionised particles from the sample or any other ion source used in mass spectrometry.

a

claim 1

8. A spectrometer according to ~~any of the preceding claims~~, in which the focusing means further comprises delay means for delaying the operation of the acceleration means for a set time after the release of said ionized particles.

a

claim 1

9. A spectrometer according to ~~any of the preceding claims~~, in which the spectrometer includes data processing means which is connected to both detectors and is operable to identify corresponding portions of the detector outputs, and measure the difference between the times at which said portions occurred.

10. A spectrometer according to claim 8, in which said portions comprise peaks in the outputs of the detectors.

a

claim 1

11. A spectrometer according to ~~any of the preceding claims~~, in which the spectrometer is a MALDI-TOF spectrometer.

12. A spectrometer according to claim 3, in which the interfacing means comprises trapping means for temporarily trapping particles released from the source in a zone adjacent the sample prior to the acceleration of the particles.

13. A spectrometer according to claim 11, in which the trapping means includes means for injecting a gas into that zone to interact with the particles.

Sub B3

14. A method of time of flight spectrometry for measuring characteristics of the m/z of ionized particles, the method comprising the steps of:-

a) releasing said ionized particles from a sample;

b) accelerating said particles along two paths;

B3 Concl'd

c) measuring the times of arrival of the particles at two points, one on each respective path, at differing distances from said sample; and

d) measuring the differences or average differences in arrival times of corresponding particles at said points to enable said m/z characteristics to be determined.

15. A method according to claim 13, in which both of said paths are contained in a single particle beam, with one path running alongside, but stopping short of, the other.

16. A method according to claim 14, in which the beam is of a generally serpentine shape.

add B4